

WAR DEPARTMENT
OFFICE OF THE ASSISTANT SECRETARY OF WAR
STRATEGIC SERVICES UNIT

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22 April 1946

*File!
Atomic
Energy
Legislative*

MEMORANDUM

TO: Files

FROM: Lawrence R. Houston

SUBJECT: GAO and Unvouchered Funds

1. I discussed on the telephone with Captain West, of the Legislative and Liaison Division, WD (Extension 6330), the history of the appropriations for the Atomic Energy Commission which Captain West has been following, particularly in regard to security of expenditures and review thereof by GAO. Captain West reported that the original May-Johnson Bill in the House Committee provided in Section 15 approximately as follows.

2. That the General Accounting Office in settling accounts of administration of the Commission will not disallow any expenditures which the Commission certifies to as necessary for its operations. The War Department was asked for its opinion of this Section and, on the basis of General Groves' opinion that his arrangements with the Comptroller General had been satisfactory, the War Department advised that such a sweeping authorization was not necessary and it would drop it from the Bill reported to the House. The ~~Senate Committee~~ on Atomic Energy revived this provision in toto. Senator Byrd objected to the breadth of the exception to review by GAO and requested that Mr. Lindsay Warren, Comptroller General, testify before the Committee. Mr. Warren is reported to have expressed himself strongly in opposition to such a provision, stating that it was unnecessary to security and unwarranted in any authorization to expend Government funds. This was about 4 April.

3. The next Monday General Groves was called before the Senate Committee, and he and Mr. Warren discussed the matter; as a result of which again the War Department advised it was not interested in the blanket exemption.

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Captain West stated that the Senate Bill was reported to the Floor on 19 April and that he would give us copies on 22 April. Mr. Warren's testimony will not be printed for some time but Captain West promised to follow up the matter and send us copies when they came through.


LAWRENCE R. HOUSTON

LEGAL PROBLEMS RESULTING FROM INDUSTRIAL
USE OF ATOMIC ENERGY

Upon receiving the kind invitation to address your group, it was felt that, inasmuch as I would speak as a representative of the lawyers of the United States, you would prefer a subject which is most currently under discussion by your colleagues there.

I must preface this paper with the apology that I am neither an expert in this field of American law nor in the German legal system. As is also apparent, I speak your language only as a foreigner and must beg your indulgence in this respect. The subject of the legal problems connected with the peaceful use of atomic energy was chosen however, because it has been one of great universal concern to the lawyers of my country and portends to become of great interest here. My profound interest in the comparative law of Germany and America has led me to believe that the legal systems are not so dissimilar, but that the questions arising under one system might also be germane to the other.

Science has today brought mankind a long way from the concepts of the ancient philosophers that all the world and matter were composed of a few elements which usually included fire, heat from the sun or some other form of extreme energy as the focal point in their belief. At the very dawn of history in the City of Thebes in Upper Egypt, the consensus was that all power in the world emanated from the Chief and oldest Supreme God and to him they ascribed the name Athom or Athom-Re. He was the same God as the Aum of the Hindus and his emblem was a perfect sphere, symbolizing a power superior to those of nature and the natural elements. The conception was then perverted by later Egyptians to the God Osiris and the emblem became the sun. Oddly enough, the present day word Atom is from the same Greek word meaning indivisible, but it is the action of dividing the atom that produces the tremendous amounts of energy available in our generation.

A new power of the Atom based upon science rather than theology was introduced to the world in 1944 and the thoughts of men in all walks of life were directed to the contemplation of the effect that the impact of this new age would have upon their daily lives. A professional connection appeared to the American lawyer upon the signing of the Atomic Energy Act of 1954 by President Eisenhower. Under the provisions of this Statute the Federal Atomic Energy Commission is authorized to remove the wraps of secrecy from reactors and all other non-military uses of Atomic Energy and to expand funds for the promotion of its usage by all private industry and private scientific research. Within a few months after this Statute became effective, i.e., by October 15, 1954, a total of 64 American corporations had already commenced participation in the program and had committed over \$5,000,000 a year to research. And by September 1954 two corporations had spent \$28,000,000 toward the construction of private reactor plants.

The role of the Federal Agency under this new legislation is merely that of providing scientific and technical advice, training scientists technicians and management in the various safety, scientific and administrative achievements which they have made to date and to license the building and operation of reactor plants. All in all, a spirit of adventure in this new field has taken hold in the United States which challenges this generation as the wilderness challenged their pioneer grandfathers and the opening of the west their fathers.

Since the existence of a new concept of energy and the creation of new circumstances surrounding its usage are unique, the common law principle of precedent and the application of the doctrine of Stare decisis are again called upon by the American lawyer in the form of analogy. Fitting these new circumstances into an existing system of jurisprudence requires assuring the greatest good for the public consistent with protecting the rights of the individual.

The Atomic Age arrived in Germany on the 26th of January of this year when the Federal Atomic Energy Commission was formed under the chairmanship of Mr. Strauss. It is still not certain as to the framework within which the Federal Republic will pursue the peaceful use of Atomic Energy, whether in a European Atomic Energy Union, i.e., Euratom, or by governmental agreements. The statute, however, fulfills the legal requirements for the commencement of Atomic research and the construction of a basic reactor.

By the enactment of this statute and the formation of the commission the time has come when the bar of Germany is also faced with a need to study these new facts and circumstances arising from the industrial use of Atomic Energy and their relation to the existing legal system. It is hoped that a sharing of common experience in this field, despite a basic difference in systems of jurisprudence, can help to bring the two professional groups closer together and promote greater equity in both countries in the usage of the newest and most powerful tool yet made available to mankind.

The basic machine in providing Atomic Energy is the reactor. Although there are many methods of converting the action of this machine into usable energy, the basis of all is the so-called "pile" consisting of one layer of uranium and graphite piled upon another until a self-sustaining chain reaction is produced. The key to this reaction is neutrons, which along with protons and electrons, form the basis of all atoms. In a reactor neutrons hit and split the nuclei of atoms releasing tremendous amounts of Atomic Energy. This splitting of the nuclei is called fission. The products of this process are 1) energy in the form of heat, 2) more neutrons, some of which carry on the reaction, 3) deadly gamma rays and other radiation and, 4) the ashes of this nuclear fire or the pieces into which the fissionable atoms are split. These latter consist of varying amounts of up to 40 different elements and most of them are highly

radio-active. These ashes are often referred to as atomic waste materials, even though many parts of them are recoverable and can be used to sustain further reactions.

The really important part of this process for the production of industrial energy is the heat which is converted to electricity by one of four present methods, one using pressurized water, another using sodium as a coolant, the boiling water reactor, and the homogeneous thorium reactor which places the fuel in a water solution at the start of the process in order to cut down the heat output at the very beginning and thus keep it under control. Reactor plants are invariably designed so that the most dangerous operations are conducted by remote control and from behind baricades of protective lead. The plants are equipped with innumerable testing devices, and also the safety regulations governing the conduct of employees and the disposal of waste materials are most rigidly enforced.

The United States has operated 25 reactors from 1943 through 1954 and the experience of these operations shows a remarkable safety record, much below that found in what are generally considered to be non-hazardous industries. This history shows no accidents involving radiation injury during 606,000 operating hours and nearly 18,000,000 man-hours. Within critical facilities, i.e., devices designed to test critical mass, coolants and other reactor components at low power, there was one accident which resulted in injury to four persons and a loss of 768 man-hours. In addition two laboratory accidents occurred in the assembly of fissionable materials and in each of these one person died and a few were injured. These constitute all of the accidents occurring since 1942! The United Kingdom has an even more impressive safety record.

A Canadian reactor, NRX, broke down in 1953 as a result of the failure of the control system. This resulted in considerable damage to the reactor structure and the release of large amounts of radio-active materials. But there were no fatalities and none of the plant personnel were significantly affected by the radioactivity during the decontamination, dismantling and clean-up processes

which followed. There was no physical damage about the reactor itself. All employees were immediately evacuated as a precaution but all were able to return to work the following day. This unfortunate accident at least taught the rest of the world that large amounts of radioactivity can be handled safely even though they are spread over large areas and throughout a complicated industrial-type plant.

What has been here said however does not mean that reactor hazards can be taken lightly or that the problems can be over-simplified. It does lend support to the large body of informed thought that with proper precautions and careful attention to reactor design, the accidents which may occur need be no greater than those occurring in other industries. The precautions referred to, however, are neither easy nor cheap.

Thus it may be seen that it would be foolhardy to be complacent about such problems because danger does exist in the operation of atomic reactors, but that proper precautions can bring them under complete control. It is with this understanding rather than with pessimism or abnormal assumptions that the legal problems should be approached.

The need for a special code of ordinances or regulations to license the operation of such an industry and control its safety measures becomes immediately apparent to the lawyer, but within this field we also find the problems of how best to enforce these rules of conduct. For example, the revocation of a license or the institution of criminal proceedings for a violation of certain precautionary rules might be far too slow. The damage might well be completed to the detriment of the public before the case could ever be heard. Under American jurisprudence a very effective tool is often the injunction. Under circumstances of urgency and emergency, a court may issue a temporary ex parte order commanding the defendant to remove dangerous condition

or cease his activity until the merits of the case can be heard. It is the opinion of many leading jurists that such a type of remedy should be made available to the controlling governmental authority in the regulation of atomic reactors to assure effective remedies of unsafe conditions. The requirements for the issuance of licenses will probably well regulate construction of reactor plants and their design, but in the scope of more immediate daily safety we must look to some of the following items.

- 1) Limitations upon the permissible doses of radiation which may be absorbed by an individual due to exposure in both controlled and uncontrolled areas, as well as limitations upon the amounts of radioactive materials that may be permitted to remain on exposed surfaces and limitations upon the amounts of radioactive effluent which may be released or discharged into the air or water.
- 2) Control of hazards, monitoring of personnel, respiratory protection, caution signs and labels for concentration areas and for containers of radioactive materials, the storage of material and the training of personnel in safe handling of materials and the use of monitoring equipment.
- 3) Control over the disposal of radioactive waste by burial in the soil or the ocean and by disposal into public sewers and the manner of disposal. This question will probably be a jurisdictional one and within the area of international law must necessarily be the subject of treaties as other international agreements.
- 4) The maintenance of records by licensed reactor plants and the reporting of overexposure.

These are all items of regulation which will require immediate rectification in the event of violation, but at the same time must be sufficiently flexible as to permit private industry to operate freely and without

undue bureaucracy. Thus the regulations must be clear concise and unambiguous so far as is feasible. They must not be written for the health physicist but for the members of industry, including the employees, the general public and for the courts which will be called upon to administer them. It is imperative that they be understandable to people who are not specially trained in the field. They must be prompted by considerations of health and safety and not merely by notions of desirable practice or good-housekeeping. They must also be prepared so as to provide for easy revision and amendment as new techniques and practices are developed in the industry.

The one great field beyond regulation which commands the interest of the lawyer is that of public and personal liability for radiation damage. Objects of damage may be property as well as persons since exposure to excessive radiation may render property unusable permanently or until after expensive decontamination processes have been employed. This is in addition to the very obvious possibility, as opposed to probability, of personal injury resulting from escaped or uncontrolled radiation.

The German law is probably more certain and more flexible to meet this new circumstance than ours, since we are confronted with the objective theory of liability with regard to the carrying on of an extra hazardous activity. The doctrine of the case of - Rylands v. Fletcher, 3 House of Lords 330, decided in 1868 has become a part of the law in nearly all of the United States. This doctrine recognizes that there is no liability for unintentional and non-negligent conduct where injury results to others, but provides an exception in the case of an extra-hazardous activity. The court there decided that one who brings onto his own lands, and collects and keeps there for his own purposes, anything which is likely to cause injury if it escapes, must keep it at his own peril, and if he fails then he shall be prima facie liable for all damage which is the natural consequence of its escape.

This strict rule of liability has been carried over to the storage of explosives and blasting operations and would logically appear applicable to cases of damage from radiation caused by escaping fission products. On the other hand the same English courts which promulgated the rule have granted an exception where the activity is one conducted under legislative permission, treating such a case as that of a "natural use of the land". In other words it is possible that a showing by the defendant that he operated his plant under the regulations prescribed by governmental authority and under license will relieve him of this absolute liability. In the case of Northwest Utilities vs. London Guarantee and Accident Co., 154 L.T.R. 89 it was held that a utility company whose gas escaped into a basement and exploded was not subject to the rule of absolute liability since it had located and used its pipes in accordance with statutory permission.

I would not presume to announce the rule of German law in such cases before an audience of such professional distinction as this, but it is my understanding that the strict rule of which I speak does not here prevail. Section 303 of the B.G.B is probably more familiar to all of you than to me but I interpret paragraph two of this section to provide an exception from liability where the defendant has complied with a regulatory statute. Palandt also advises on page 677 that the Sprengstoffgesetz of 1884 falls within the regulatory statutes which are intended by that paragraph. It would thus seem analogous that a statute regulating the safety features of an atomic reactor would also be included.

It should also be noted that under German Law one must consider the exact effect that Paragraph 907, Satz 1 of the BGB will have upon the location of reactors. It is there provided:

"The owner of real property may demand that no installation be maintained or constructed on adjoining property which would, by its maintenance or use, produce harmful results upon his land, when such is evident from the very nature of the installation. Where an installation conforms to all statutory provisions, i.e., has observed a definite regulation regarding the distance from the border of property from within which the installation may be constructed, or has observed other special safety regulations, then the removal of the installation can only be demanded where a harmful result actually exists."

Attention should be given to a great deal of logic in discussion of this particular paragraph which is contained in Münchener Neue Juristische Wochenschrift, 54, s. 513. It might well be that a very complete and thorough regulation of the location of reactors by a competent ministry will serve to preclude spurious suits.

It is provided in paragraph 1 (a) of the Liability Code that,

"Where an accident which results in both personal bodily injury or damage to property can be traced back to effects stemming from electricity or gas which come from the installation for the supply or manufacture of electricity or gas then the operator of the installation is obligated to respond in damages. The same shall apply even though the damages did not result from the effects of electricity or gas but rather are caused by the existence of such an installation, except in cases where the installation is shown to have been in proper condition at the time of the accident. An installation shall be deemed to be in proper condition so long as it conforms to recognized rules of technical practice.

"Paragraph 1 shall not apply to installations which actually serve for the transmission of signals or signs.

"The liability for damages under sentence 1 shall not exist:

1) Where the damages occur inside of a building and were caused by an installation found therein or if they occurred within the boundaries of real property which is in the possession of the operator of the installation and upon which the installation is located.

2) Where an appliance for the use of Energy is damaged or damage has been caused by such an appliance.

3) Where the damages have been caused by a higher power (Act of God), except where the damage is attributable to the falling of electrical supply lines.

"Where the fault of the person injured has contributed to the damage then Section 254 of the Civil Code shall apply; in cases of damage to property, fault on the part of the person who exercises actual control over the property shall be treated as the fault of the person damaged."

It will be noted that the accident need not result from the typical dangers inherent in gas or electricity, but rather liability can be incurred where the damage is caused by a falling post or the falling of wires which carry no electricity. In the case of an atomic reactor the damage could proceed from sources which have not as yet been customary in the construction of stations for the production of electrical energy. It is stated in Reinhardt and Geigel, Der Haftpflichtprozess, in their commentary upon this particular section, page 224, "plants for the production of energy do not fall within the statute because they do not endanger the general public as a rule." Although the operating records of atomic reactors do not indicate a very likely possibility of danger to the general public, it is apparent that a remote possibility does exist and thus the commentator's premise has been destroyed. It would thus follow that this section of the statute will in all probability be the basis for liability in such cases, and the burden of establishing the safe condition of the plant and the exercise of due care in the event of an accident will be upon the owner or operator of the plant.

In the field of liability questions, one must also give thought to the liability of manufacturers of reactor parts. A defect in a component part of a reactor, faulty construction of reactor facilities, and the mishandling or misuse of radioactive products may also cause considerable damage and we thus come to the question of the manufacturers liability to the third persons injured by his negligence in this respect. The rule formerly in the United States was that a manufacturer was only liable to the person to whom he sold his goods if they were defective and this on the basis of a warranty. In the early days of the automobile this doctrine changed and it was held that a manufacturer warranted to the ultimate consumer that the product was manufactured under due care and precautions for the safety of the consumer, or user. The rule is now stated in the Restatement of Torts, Section 395,

"A manufacturer who fails to exercise reasonable care in the manufacture of a chattel, which, unless carefully made, he should recognize as involving an unreasonable risk of causing substantial bodily harm to those who lawfully use it for a purpose for which it was manufactured and to those whom the supplier should expect to be in the vicinity of its probable use, is subject to liability for bodily harm caused by its lawful use in a manner and for a purpose for which it was manufactured."

In the case of Moran v. Pittsburg Steel, 166 F 2d 908, decided in 1948, the defendant company had designed and installed storage tanks for the storage of liquified natural gas for a utility company. Even though the tanks were installed upon the land of the utility company, and became a part of the latter's property and even though the explosion occurred thirteen months after the installation, the court held the manufacturer liable for the injuries incurred by third parties who happened to be in the area at the time of the explosion. The liability was based upon negligent defects in the manufacture of the tanks, and also upon the negligence in the installation of them. It must be assumed from

this decision that the rule would apply to both manufacturers and construction contractors engaged in the erection of atomic reactors. In any event, however, there must be proof of negligence in order to create liability in such cases and it is quite likely that in many such cases there will be evidence of contributory negligence and in some the doctrine of the assumption of risk will apply.

It should also be noted along this line in considering the liability of manufacturers of component parts of reactors that modern case law in the United States extends this doctrine to a distributor and imposes upon him a duty to indicate by proper instruction the potentiality of danger in an inherently dangerous article. A danger is inherent when it is derived from the nature of the article itself, as opposed to dangers resulting from a defectively made article that is otherwise ordinarily harmless. Negligence attaches not to the manufacturing but to the failure to give proper instructions and warning.

Many of the problems which are presented to the American lawyer by these doctrines are covered under the German law by the doctrine of causal connection. However, there also the application of the doctrine in difficult cases also becomes strained and difficult. The question is always what was foreseeable to the defendant at the time he acted or what should have been foreseeable. The judge in deciding such a case must retroactively place himself mentally in the position of the person acting. This is not easy since he then has before him the entire file and is already well acquainted with the results that will follow should the action that was taken be repeated. He must thus dismiss from his mind all of those things which he knows from reading the file in the case and consider what the average person would do under the same or similar circumstances.

It is obvious that negligence will thus be the basis of liability in atomic reactor cases under American law and therefore proof of that negligence will be of the

utmost importance. There exists a principle which may tend to benefit the plaintiff and ease the problems of proof; namely the principle of res ipsa loquitur. Basically, this doctrine which applies when the cause of the injury or damage is under the sole control of a defendant and experience indicates that the accident causing the harm would not happen if due care was exercised, permits the drawing of an inference of negligence from a mere recital of the occurrence. The classical definition of the doctrine is that given by L. Erle in Scott v. London Docks Co., 2 H & C. 596, "When the thing is shown to be under the management of the defendant or his servants, and the accident is such as in the ordinary course of things does not happen if those who have the management use proper care, it affords reasonable evidence, in the absence of explanation by the defendant, that the accident arose from a want of care." The reason for the rule is that the party injured is usually without means of establishing the exact cause of the accident in such cases. The difficulty is not in stating the rule but in determining when such a case is presented. The doctrine has been held to include unexplained explosions in a powder factory, boiler explosions, bursting bottles, etc.

The approach to the problem of the burden of proof under German law is often very similar (Anscheinsbeweis) and the showing of such circumstances as will infer negligence will suffice to shift the burden of going forward with the evidence. Where the application of these doctrines will lead in the proof of negligence in atomic radiation cases is yet to be determined. The facts in any case will predominate and shape the ultimate form of the law. We should all be careful to avoid hasty generalizations that do not consider that the new science will be progressing and we should not become so fixed that we cannot progress with it. It would be well to avoid the mistakes which the legal profession made when the automobile first presented new questions of negligence and liability.

In the United States, legal circles are also raising questions regarding the State as a party to litigation resulting from the ownership of the reactor fuel or the regulation of reactors. It is contemplated that licensed firms operating industrial reactors will purchase their Uranium or Thorium from the Atomic Energy Commission and thus defects in the fuel would be the fault of the Government as would defects in the design of the plant or location when prescribed by regulation or specifically ordered by the Commission. Problems of governmental liability could also be created by an employee of the Commission ordering or approving an inadequate method of disposal for atomic waste products. I also note that governmental control of fuels will be proposed soon in Germany under "Atomstatute" recently proposed by the German Atomic Energy Commission and which will soon be presented to the Cabinet for inclusion in the forthcoming legislative program. This proposal also provides that the Commission shall store all atomic fuels which a licensee is not in a position to put to immediate use.

Under American law the State as a sovereign is not subject to suit without its consent, but this consent has been given in a limited form by the Federal Tort Claims Act. Section 410(a) of that act, however, requires a "negligent or wrongful act or omission" on the part of a government employee. This statute is not as severe as Sec. 2 (1) (c) of the British Crown Proceedings Act (10 and 11 Geo. VI, c.44) which imposes government liability absolutely by reason of the ownership or control of an extra hazardous instrumentality. Such an absolute liability does not exist under the American law as shown by the decision in Dalehite v. U.S., 346 U.S. 15, which relieved the Government from liability in connection with the explosion of an ammonium nitrate storage tank in the Texas City disaster. The court held that the accident resulted from the decisions of policy by government employees in the storage facilities under the ammonium nitrate fertilizer program, but that the employees acted

within the proper limits of the discretion left to them and thus were not negligent but merely wrong and no liability could attach to the Government.

Whether the industrial reactor is to be operated by private industry or by Government in an industrial capacity would seem to make little difference in the over-all problem which is one of balancing the rights of the individual injured and the fault of the operator in an equitable and just manner. A private undertaking on the part of Government would not seem to justify its hiding behind the mask of sovereignty to the prejudice of one injured by negligence in the operation of an industrial reactor. The final application of the principles to the state when made a party to cases arising out of the industrial use of atomic energy must wait for time and the courts to determine.

While considering the problem of the liability of the operator of the reactor toward third parties one must also consider the place in the legal system of liability for injury to employees. Under the system prevailing in most of the United States an employee is entitled to compensation for injuries received while in the course of his employment, without regard to whether these are occasioned by the negligence or intentional wrong of the employer, a fellow worker or by third persons. It is immaterial how the injury occurred so long as it occurred in the course of his employment. This compensation for injury is required by the laws of most states to be carried by state operated insurance funds, but in some states private insurance must be employed and in still others it is optional whether the employee is insured in a private or public insurance system.

Under the laws of nearly all states an employee may waive the benefits of this insurance after he has been injured and elect to sue on the basis of negligence or a willful wrong. When he makes such an election however he waives his insurance rights and the suit may be defended by the employer on the basis of a lack of negligence or

or the contributory negligence of the employee himself. Of course the damages are higher where negligence can be proven than they would be under the general insurance provisions since he can also recover damages for pain and suffering and punitive damages.

As the natural result of this situation in the law an employee does not generally waive his insurance rights unless he has a clear and virtually undisputable claim. Most employers carry private insurance to protect them against both types of claims.

It is anticipated that strict regulation by the Atomic Energy Commission as to the methods of constructing and operating reactors, defining the testing equipment to be carried by employees and the training of the employees in the usage of such equipment will serve to define what is a non-negligent method of operating such an enterprise. One can also foresee the possibility of many close questions of fact in such cases because radiation damage frequently does not appear until long after exposure. For example, an employee may have been engaged at one time in work on the disposal of fissionable waste products where the safety measures of the employer were inadequate, but later is shifted to another portion of the operation where the safety measures employed were far above the minimum standard. Should he later prove to be suffering from radiation damage it would be very difficult to establish which job gave rise to the injury. Of course, the daily testing procedures of the employer should reveal the overexposure immediately and proper records of the daily amount of exposure of each employee should show the possibility of injury, but the question then arises as to whether the obligation on the employer to keep such records places the burden of proof upon him to establish that the employee was not exposed during the disposal operation.

I believe that some of the same questions in this direction also exist under the German Law for as I read Paragraph 618, Satz III, BGB, I note some rather general language. It reads,

"Where the person entitled to services does not fulfill the duties to which he is obligated with respect to the life and health of the person bound to perform services then the provisions of Section 842 through 846 of the Civil Code regarding liability for damages on account of unlawful acts shall be correspondingly applicable."

Under the German law there are also provisions for insurance by the employer to cover injury to the employee under Gesetz and thus it would appear that many problems could also exist in this field here.

As in all considerations of the practical aspect of public liability one must explore the insurance capacity to assume this liability, for private industry can seldom operate without divesting itself of at least a major portion of this risk. In the field of property damage a unique legal question is presented in determining whether the heat generated in nuclear fission is in fact a fire within the meaning of most fire insurance policies. Since the source of most American law is Judicial many finely worded attempts have been made to define the word, but none are absolutely satisfactory to cover the atomic reaction. Most of these definitions require visible light to be emitted and the transformation of the molecular structure of the substance in such a manner as to give off heat and energy in considerable quantities. Most of these definitions could well be interpreted to include nuclear fission, but were obviously not intended to do so. The principal difference to the scientist between a fire and an atomic reaction is that in the former the atoms are rearranged but not destroyed while in the latter the bombardment of the atoms by the escaping neutrons destroy the original atoms in their former identifiable form. Just how this scientific differentiation will be received by the courts however, is still problematical and for several years now the fire insurance companies in America have been including special riders which specifically exclude atomic reactions and the heat from nuclear fission from the coverage of the policy.

I have noted recently that seventy private fire insurance companies in the United States have joined together to establish an inter-insurance group to commence writing coverage for such losses. The same type of association has been entered into in the field of personal injury liability as I am informed by the newspapers and these steps by the insurance industry are most convincing evidence of the future of the industrial use of Atomic Energy. When one contemplates the high financial risk of such liability in the case of a runaway reactor and the traditional conservatism of the insurance business, it can only mean that they have carefully investigated the problem and find a highly remote possibility of heavy loss.

In considering the possibility of damage extending over a wide area it is also likely that questions of the jurisdiction of courts in the various areas will also come to the fore. In the United States we are perhaps a little more troubled by this problem because the separate States are quite autonomous and the rule of where the suit must be brought is generally more strict than is the case in Germany. Many of such questions in Europe, however will be matters of international law due to the proximity of the different countries. Since the disposal of radioactive wastes is a matter which might affect other nations it is of course a proper subject for treaty negotiation. The greatest problem in this respect ~~is will arise from the disposal of atomic wastes where it is contemplated that they will be disposed of~~ in bodies of water which touch upon other nations.

Another aspect of the problems resulting from the industrial use of Atomic Energy is that of limitations. Since radiation damage is often quite slow to appear, it is also a matter of when the right of action is outlawed by the statute. Some precedent in this regard can be found in both countries under those cases involving radiation damage resulting from the industrial usage of radium. We have had to modify our doctrine in this respect in the United States to hold that the right of

action first commences when the injury is discovered. The rule under German law is the same in all cases and has been applied to other types of injuries than that due to radiation. Whereas our statute usually commences to run from the date of the accident, the provisions of Paragraph 302, Abs. 1, BGB, are much clearer and base the action upon knowledge of both the injury and the person who caused the injury.

Conclusion:

It will be seen that many questions have been presented in this paper and few, if any, have been answered with any definiteness. This is as it should be until specific cases arise for decision, since new scientific discoveries and techniques may alter the complexion of the legal problems which may arise. However, it is not too early for lawyers to put on their thinking caps and set about providing a place in their legal system for this new form of Energy which will soon become a part of the industrial world about us. Although, as a profession, we are not empowered to enact the laws, we are ethically bound to protect the public by calling the attention of the legislative and executive branches of government to gaps in existing statutes which impede the administration of justice. Since jurists will be called upon to administer the laws in disputes arising out of this new form of Energy it is not too early to begin preparing the way. This has been a most enjoyable experience to me and I only hope that some points worthy of consideration have been forthcoming.